



# Glenn Research Center Investigations to be Launched on STS-118/ISS Flight 13A.1

## Coarsening in Solid-Liquid Mixtures-2 (CSLM-2)



### Objective:

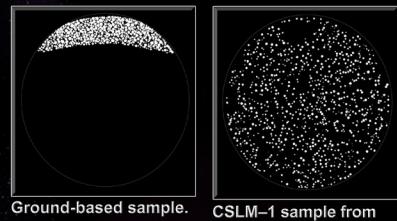
- Support the development and improve the accuracy of theoretical models of the Ostwald Ripening (coarsening) process.
- Determine the factors controlling the morphology of solid-liquid mixtures during coarsening.
- Determine the kinetics of the coarsening process, the spatial distribution of the particles, and the particle size distribution as function of the volume fraction of solid.

### Relevance/Impact:

- CSLM-2 results will provide input that will improve design codes that are based on incomplete models and databases.
- CSLM-2 will aid in the development of new high-temperature materials, such as those used in nuclear propulsion and waste heat coolant loops.

### Development Approach:

- CSLM-2 hardware employs furnaces that are significantly more isothermal than those used in CSLM, which flew on Microgravity Science Laboratory-1 (MSL-1), eliminating the problem of elongated grains along the outer surface of the samples.
- Samples are developed by the principal investigator and then integrated into the sample processing units (SPUs) by the engineering team.
- Following launch of the SPUs, they will be integrated with the electrical control unit (ECU), already on orbit, and then operated within the Microgravity Science Glovebox (MSG).



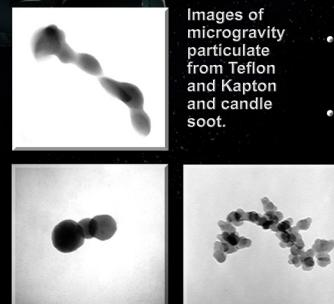
Flight SPU #1 and flight ECU #1 installed in the MSG onboard ISS.

## Smoke Aerosol Measurement Experiment (SAME)



### Objective:

- Make measurements of three moments of the particle size distribution for the microgravity smoke from several materials found in spacecraft considering the effects of sample temperature, air flow, smoke residence time (near the source) and smoke aging.
- Make measurements of the effect of  $\mu\text{g}$  and  $1\text{ g}$  on the size distribution of liquid aerosol smokes (using an idealized smoke e.g. DBP) to provide data for numerical model comparison.
- Evaluate the performance in  $\mu\text{g}$  of the two existing U.S. spacecraft smoke detector designs for the test conditions.
- Evaluate other smoke detection/sensing devices at NASA's request for the test materials.



Images of microgravity particulate from Teflon and Kapton and candle soot.



SAME in the MSG mockup.

### Relevance/Impact:

- SAME will provide data required for the rational development of fire particulate detectors on exploration vehicles and habitats.

### Development Approach:

- The Dust and Aerosol Measurement Feasibility Test (DAFT) microgravity experiment demonstrated the microgravity performance of the P-Trak condensation nuclei counter, a key diagnostic utilized by SAME.
- The project team pursued a protoflight development approach.
- After initial setup by the crew, the experiment will utilize uplinked parameters for autonomous operations. Consumables will be periodically changed out by the crew.